REMARKS

Claims 1-20 are in this application and are presented for consideration. By this Amendment, Applicant has amended claims 1 and 13. Applicant has also added new claims 15-20.

Claims 1-7 and 11-14 have been rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al. (U.S. 3,998,373).

Claims 1 and 13 have been amended to clarify that the determined length deviation Δl is compensated by a modified plasticization and a modified compression stroke. The modified plasticization and compression stroke are always correlated based on the factor C. This advantageously allows for two workpieces to be welded together with precise tolerances while maintaining excellent welding quality. The prior art as a whole fails to disclose such features of welding precision advantages.

Jones et al. discloses a length compensation for special friction welding machines, namely, inertia-controlled friction welding machines with flywheel. The shaft with one component is accelerated in these by means of a motor, and the rpm increases. As soon as a certain triggering rpm has been reached, the motor is switched off and the feed is switched on for generating the upsetting pressure, and the workpieces to be welded together are brought into contact with one another, and the rotary motion is braked during a mutual frictional engagement and stopped.

Jones et al. teaches the person skilled in the art to compensate any possible length deviations of the components to be welded together automatically by generating a velocity

control compensation signal (Column 1, lines 51 through 61). A measuring means (18) (Figure 1, column 2, line 56 to column 3, line 2), in which the overall length of the two components to be welded together is measured and compared with a desired value of the length, is present for this purpose. A length difference value or a length difference signal is obtained from the comparison (column 3, lines 29 through 49). However, this length value cannot be used directly for controlling the friction welding machine. It must first be converted into an rpm value, as this is disclosed in Figure 3 and in conjunction with column 8, lines 33 through 43. The "weight factor" being mentioned here is a proportional factor, with which the change in rpm that belongs to a certain length deviation can be calculated. This change in rpm is then added to the desired value set previously for the switch-off rpm. This may happen by subtraction in case of a short length with a negative sign. The motor is then switched off at a correspondingly higher rpm or at a lower rpm and the upsetting operation is begun. The "weight factor" is determined before from a series of test weldings with different welding speeds (column 8, line 67 to column 9, line 5). Jones et al. is based on the assumption that a length deviation of the components, which is detected before the friction welding, can be compensated by an equal change in the upsetting path. There is a direct relationship between the upsetting path and the switch-off rpm here. Consequently, if the switch-off rpm is increased or decreased, the upsetting path changes correspondingly. Only the beginning of upsetting is changed by the "weight factor," and everything else adjusts itself in the subsequent upsetting operation in case of constant upsetting force.

Jones et al. fails to make a distinction between a phase of plasticization and an altered compression stroke phase. Jones et al. also fails to take into account the fact that different changes, which affect the shortening of the component, take place in the material during plasticization and during compression stroke. The so-called "weight factor" in Jones et al. also does not affect the setting of plasticization and the altered compression stroke as claimed. In fact, Jones et al. makes no distinction between plasticization and an altered compression stroke. Compared with the present invention, the process of Jones et al. starts at a certain initial rpm of the moving workpiece, which rpm can be influenced by the "weight factor." The feed of Jones et al. takes place with a force set permanently, which is the same for all friction welding operations. Only the feed path of Jones et al. will change, but this happens automatically and cannot be influenced by control means during the friction welding process. Only the initial rpm of Jones et al., beginning from which the friction welding operation starts, is determined via the "weight factor." In contrast to the present invention, Jones et al. discloses that there also is only a constant feed in a friction welding process. Plasticization also begins in Jones et al. at the same time with the beginning of the feed and the first contact of the components. According to Jones et al., there is no differentiated compression stroke due to the further feed becoming established automatically based on the constant force, and, above all, there is no distinction between plasticization and compression stroke.

Jones et al. fails to teach and fails to suggest an altered compression stroke as claimed. The person of ordinary skill in the art finds no reference in Jones et al. that plasticization and altered compression stroke are different things, which can be influenced separately from each

other. Compared with the present invention, Jones et al. discloses that it is no longer possible to influence the friction welding process with the beginning of feed. As such, Jones et al. does not teach or suggest a correction factor that influences process parameters of a friction welding process as claimed. Jones et al. fails to suggest a correction factor that relates to friction of turning workpieces and a pushing path as claimed. In contrast to the Jones et al., the correction factor of the present invention allows regulation of friction created between the workpieces as well as the pushing force exerted on the two workpieces. This advantageously provides for a precise control of the workpieces so that precise tolerances are achieved. Jones et al. merely discloses controlling the rotational speed of a friction welder but fails to mention anything about regulating friction and the pushing stroke as claimed. As such, the prior art as a whole takes a different approach and does not disclose each feature of the claimed combination. Accordingly, Applicant respectfully requests that the Examiner favorably consider claims 1 and 13 as now presented and all claims that respectively depend thereon.

Claims 8-10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al.

Jones et al. fails to teach or suggest the combination of calculating a change in friction duration, Δt, as a product of a correction factor C_t or calculating forge stroke, Δp, as the product of a correction factor C as claimed. Jones et al. is completely void of any suggestion or teaching for such features. The features of claims 8-10 advantageously provide for more precise control of the workpieces so that precise tolerances can be achieved. Jones et al. fails to disclose such welding precision advantages since Jones et al. is completely void of any

teaching or suggestion for calculating forge stroke or a change in friction duration as claimed. Accordingly, all claims define over the prior art as a whole.

Applicant has added new claims 15-20. New independent claim 16 provides for features similar to those found in claim 1, but in different claim language. New dependent claims 15 and 17-20 have been added to further clarify the features of the invention. Applicant respectfully requests that the Examiner favorably consider new claims 15-20 as presented.

Favorable consideration on the merits is requested.

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Attached: Petition for One Month Extension of Time

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